

Table 6.4. Characteristics of the tobacco support program: flue-cured tobacco, 1975–2000

Year	National marketing quota (million lbs.)	National average support price (cents/lb.)	Real average support price* (cents/lb.)	No-net-cost assessment <sup>†</sup> (cents/lb.)	
				Producers	Buyers
1975	1,491	93.2	173.2		
1976	1,268	106.0	186.3		
1977	1,116	113.8	187.8		
1978	1,117	121.0	185.6		
1979	1,095	129.3	178.1		
1980	1,094	141.5	171.7		
1981	1,013	158.7	174.6		
1982	1,013	169.9	176.1	3.0	
1983	910	169.9	170.6	7.0	
1984	804	169.9	163.5	7.0	
1985	775	169.9	157.9 <sup>‡</sup>	2.50	
1986	729	143.8	131.2	2.50	1.50
1987	707	143.5	126.3	2.00	2.00
1988	754	144.2	121.9	1.13	1.13
1989	891	146.8	118.4	1.12	1.12
1990	878	148.8	113.8	1.00	1.00
1991	878	152.8	112.2	1.00	1.00
1992	892	156.0	111.2	1.00	1.00
1993	892	157.7	109.1	1.00	3.00
1994	803	158.3	106.8	3.00	5.00
1995	935	159.7	104.8	0.80	1.80
1996	874	160.1	102.0	1.00	1.80
1997	974	162.1	101.0	1.00	1.00
1998	814	162.8	99.9	1.00	1.00
1999	666	163.2	98.0	1.00	1.00
2000	543	164.0	95.6 <sup>§</sup>	2.50	2.50

\*Real average support price is obtained by dividing the nominal support price by the national Consumer Price Index; the average of 1982–1984 is the benchmark.

<sup>†</sup>No-net-cost assessment includes marketing budget deficit assessments from 1991 through 1998.

<sup>‡</sup>The effective support price in 1985 was 165.0 cents/lb. by reduction of certain grades.

<sup>§</sup>Preliminary estimate.

Sources: U.S. Department of Agriculture 1997b, 1999a,b.

**Table 6.5. Characteristics of the tobacco support program: burley tobacco, 1975–2000**

Year	National marketing quota (million lbs.)	National average support price* (cents/lb.)	Real average support price† (cents/lb.)	No-net-cost assessment‡ (cents/lb.)	
				Producers	Buyers
1975	670	96.1	178.6		
1976	635	109.3	192.1		
1977	636	117.3	193.6		
1978	614	124.7	191.3		
1979	614	133.3	183.6		
1980	614	145.9	177.1		
1981	660	163.6	180.0		
1982	680	175.1	181.5	1.0	
1983	647	175.1	175.8	5.0	
1984	582	175.1	168.5	9.0	
1985	524	148.8	138.3	4.0	
1986	493	148.8	135.8	2.75	1.25
1987	464	148.8	131.0	2.00	2.00
1988	473	150.0	126.8	0.80	0.80
1989	587	153.2	123.5	1.00	1.00
1990	601	155.8	119.2	1.00	1.00
1991	724	158.4	116.3	1.00	1.00
1992	668	164.9	117.5	1.00	1.00
1993	602	168.3	116.5	1.00	3.50
1994	536	171.4	115.7	4.50	4.60
1995	546	172.5	113.2	1.00	1.00
1996	631	173.7	110.7	1.00	1.00
1997	704	176.0	109.7	1.00	1.00
1998	635	177.8	109.1	3.00	3.00
1999	451	178.9	107.4	3.00	3.00
2000	247	180.5	105.2§	3.00	3.00

\*The support price was reduced from 178.8 cents/lb. and the no-net-cost assessment was reduced from 30 cents/lb. by Public Law 99-157, sec. 6 (1985).

†Real average support price is obtained by dividing the nominal support price by the national Consumer Price Index; the average of 1982–1984 is the benchmark.

‡No-net-cost assessment includes marketing budget deficit assessments from 1991 through 1998.

§Preliminary estimate.

Sources: U.S. Department of Agriculture 1997a; 1998a,b; 1999a, 2000.

prices for domestically grown tobacco are artificially high. Some estimates of the distortions resulting from the support program were provided by Sumner and Alston (1985) in their analysis of the economic consequences of removing the tobacco price support system. Their estimates were based on a detailed simultaneous equations model of the supply and demand for tobacco and tobacco products (cigarettes) that allows for substitution between domestic and foreign tobacco in cigarette production. The authors estimated that domestic tobacco output would rise by 50–100 percent or more if supply restrictions were eliminated. This large increase in the quantity of tobacco supplied would lead to sharp reductions in tobacco prices. As a result of the increase in output, tobacco prices would fall by 20–30 percent, and the variability of tobacco prices would increase. However, overall revenues from tobacco growing would rise by 15–60 percent or more.

Moreover, this analysis predicted that the sharp drop in domestic tobacco prices that would follow the removal of supply restrictions would lead domestic producers of cigarettes and other tobacco products to use less foreign-grown tobacco. These estimates assumed the elimination of the program in 1983 and thus do not take into account the more recent changes in its operation. More recent estimates from Zhang and colleagues (2000) suggest that the conclusions of Sumner and Alston (1985) still apply. For example, they estimated that the price support program raised tobacco leaf prices by 36 cents a pound in 1994. This price is about 21 percent above the estimated price in the absence of the support program.

The removal of the support program would also make domestic tobacco growers more competitive in world markets. In the 1980s, U.S. tobacco prices exceeded world market prices by 40–60 cents per pound (Warner 1988). Although part of the differential can be explained by the higher quality of U.S. tobacco, a significant factor is the U.S. tobacco support program. Sumner and Alston (1985) predicted that U.S. tobacco exports would have grown by about 100 percent if the tobacco support program had been eliminated in 1983. This change would have had an adverse impact on foreign tobacco growers, as producers of foreign cigarettes and other tobacco products increased their use of tobacco grown in the United States.

Although the artificially high prices resulting from the support program tend to increase the income of small tobacco farmers, they likely receive relatively less benefit from the program than the tobacco quota owners. Because most small tobacco farmers rent some or all of their allotments from the quota owners at a significant cost (Watkins 1990), these farmers pay rents

equivalent to the excess value created by the support program. In the absence of the program, reduced income for these farmers would likely be offset by the resulting reduced rent they paid. Quota owners, on the other hand, have been estimated to lose about \$800 million annually were the support program eliminated (Sumner and Alston 1985).

Despite the differing likely effects on quota owners and small tobacco growers, eliminating the tobacco support program would probably not alter existing trends in the concentration of tobacco production into larger farms (Sumner and Alston 1985). Rucker and colleagues (1995) have estimated that eliminating the program's intercounty restrictions on the transfer of tobacco quotas would have little overall impact beyond redistributing wealth from some tobacco growers and quota owners to others. (Consequently, these researchers suggest that the restrictions have remained in effect not because the gains associated with them are large but because the political costs of removing them are.) Moreover, removing supports would cause a movement away from regions where the costs of growing tobacco are relatively high toward those where costs are relatively low. The loss of income to quota owners would lead to reductions in personal income of up to 2–3 percent for counties that are highly dependent on tobacco; larger losses would occur in the relatively high-cost counties. However, total incomes would rise in areas that experienced a great expansion in tobacco growing. In comparison, the effect of altering another government program would be considerable. Increases in cigarette excise taxes are also likely to bring significant losses to quota owners. Sumner and Wohlgenant (1985) estimated that doubling the federal cigarette excise tax in 1983 would lower quota owners' lease income by an average of 13 percent, or about \$44 million.

As a result of the sharp drop in the price of tobacco, cigarette prices could fall. Tobacco costs, however, are a relatively small component of cigarette prices. Grise (1995) estimates that the 40- to 50-cent per pound drop in tobacco prices resulting from the elimination of the support program would reduce cigarette prices by only 1–2 percent. Zhang and colleagues (2000) estimate an even smaller impact, concluding that cigarette prices are 0.52 percent higher than they would be in the absence of the support program. As noted by Sumner and Alston (1985), a reduction in cigarette prices would lead to a rise in U.S. cigarette exports. Moreover, estimates of the price responsiveness of cigarette demand (described in "Effect of Price on Demand for Tobacco Products," later in this chapter) suggest that the reduction would lead to an increase of no more

than 1 percent in cigarette smoking. At least part of the increase would come from increased smoking among young people.

Opponents of the tobacco support program suggest that it can be removed with little impact on the farmers it is intended to benefit. For example, the less than 2-percent reductions in cigarette price that would result from eliminating the support program could be more than offset by an increased excise tax on cigarettes. A portion of the revenues generated from the tax hike could be used to help tobacco farmers diversify into other crops (through low-interest loans, grants, or other programs) or to purchase the farmer's tobacco base to retire it from tobacco growing (Northup 1993). Similarly, some of the funds could be used to develop nonfarm businesses, train farmers for other occupations, provide income support, and offer other economic support for local economies in transition (Womach 1994a).

Critics also point out that the support program creates indirect political consequences: the dependence created by the support program results in a strong political constituency, composed of tobacco farmers and holders of tobacco allotments, that can impede legislation to reduce tobacco use (Taylor 1984; Warner 1988; Zhang and Husten 1998). In the absence of the support program, tobacco growing would likely become much more concentrated (Sumner and Alston 1985). Warner (1988) has observed that the reduction in numbers would lead to reduced political influence. Moreover, he describes the apparent inconsistency present when one arm of the federal government seemingly endorses tobacco production by continuing an economic support program even as another engages in numerous activities to reduce tobacco use (Warner 1988).

## **Evolution of the U.S. Cigarette Industry**

Through much of the 19th century, most of the demand for tobacco products centered on smokeless tobacco and cigars (see Chapter 2). Cigarettes were relatively less popular, although the demand for them increased gradually during the middle of the century (USDHHS 1992). The watershed year for the cigarette, however, was 1881, when James Albert Bonsack announced his development of a machine that replaced hand-rolling as the primary means of making cigarettes. The mechanization of production significantly reduced the costs of manufacturing cigarettes and, consequently, reduced cigarette prices. The steep declines in cigarette prices relative to the prices of other tobacco products, due largely to Bonsack's cigarette

machine, contributed significantly to the rapid rise in the popularity of cigarettes during the late 19th and early 20th centuries (Wagner 1971).

James Buchanan Duke was the first cigarette producer to acquire rights to the new machines, which he installed in 1884. Duke entered into long-term contracts with Bonsack to use the machines at a cost lower than Bonsack would make them available to other producers. Because of the resulting substantial cost advantage in production for his company, Duke successfully waged price wars with other producers while still earning relatively high profits. Over the next decade, the Duke family formed a holding company, which was composed of their firm and several competitors they had acquired. By 1889, as a result of its aggressive pricing and marketing strategies, the holding company effectively monopolized U.S. cigarette markets (controlling more than 90 percent of the market), as well as portions of the markets for other tobacco products. Eventually, in an attempt to avoid antitrust prosecution under the Sherman Act, the Dukes converted the holding company into The American Tobacco Company. By 1901, The American Tobacco Company dominated all of the U.S. tobacco markets except cigars. The company was also a considerable presence in cigarette markets around the world.

In response to allegations that The American Tobacco Company was abusing its market position, the U.S. Department of Justice charged the firm with violating the Sherman Act. In 1911, the Supreme Court dissolved the company, thereby creating several new firms from the conglomerate, including a new American Tobacco Company (which later became American Brands, Inc.), Liggett & Myers Tobacco Company, R.J. Reynolds Tobacco Company, and Lorillard Tobacco Company. The American Tobacco Company was also divested of its foreign holdings (Imperial Tobacco Ltd. and British-American Tobacco Company Ltd. [B.A.T. Company]). Imperial Tobacco Ltd. eventually monopolized cigarette manufacturing in Great Britain, and B.A.T. Company concentrated on manufacturing in British colonies and elsewhere. Both companies ultimately resumed some operations in the United States (Johnson 1984). Although Imperial Tobacco Ltd. eventually dropped out of U.S. markets, B.A.T. Industries PLC, the parent company of B.A.T. Company, owns Brown & Williamson Tobacco Corporation, a large U.S. cigarette manufacturer.

R.J. Reynolds Tobacco Company (which had no cigarette production after the breakup) soon developed a new type of cigarette by using burley tobacco, which was quickly copied by the other producers. By the 1920s, the cigarette producers were competing

aggressively in promoting their main brand—for example, R.J. Reynolds Tobacco Company's Camel, The American Tobacco Company's Lucky Strike, and Liggett & Myers Tobacco Company's Chesterfield. In addition, firms on the competitive fringe attempted to compete through price with their so-called 10-cent brands (Robert 1967). (For a more detailed discussion of the domestic operations of U.S. cigarette firms before World War II, see the Surgeon General's report *Smoking and Health in the Americas* [USDHHS 1992]).

The U.S. Department of Justice eventually challenged the four producers' coordinated wholesale and retail pricing practices. In 1941, on the basis of conduct starting as early as 1933, these producers were charged with violating the Sherman Act by conspiring to restrain trade in an attempt to monopolize the industry. Their wholesale tobacco-purchasing practices were deemed to be monopsonistic—that is, characteristic of a market situation where one buyer exerts a disproportionate influence—and their retail pricing was thought to reflect collusive behavior. In 1946, basing its decision on the novel legal concept of "conscious parallelism," the Supreme Court upheld a jury decision that found the firms guilty. The uniformity of prices at both the wholesale and the retail level (a result that could occur in any highly competitive market), the near-synchronous increases in prices, and the raising of wholesale prices when labor costs were falling were viewed by the court as evidence of tacit collusion.

As a result, the firms were fined up to \$250,000 each, a relatively minor penalty compared with their profits.

Johnson (1984) and others have noted that the Court's decision was not supported by purely economic reasoning. There was little if any evidence that cigarette firms were jointly restricting output to raise cigarette prices and, consequently, profitability. Similarly, there was no evidence that the firms limited their wholesale purchases of tobacco to depress tobacco prices and production costs and, consequently, to increase profits.

The Court's decision had little impact on the subsequent structure of the U.S. cigarette industry. The practical result has been that, from 1946 until today, the combined market shares of the six major firms (five after the merger of Brown & Williamson and American Brands, Inc.) has exceeded 99 percent, although individual market shares have changed significantly (Table 6.6).

More important in changing relative market shares was the release of information during the 1950s and 1960s on the health consequences of cigarette smoking. In the 1950s, Philip Morris Companies Inc., R.J. Reynolds Tobacco Company, and Lorillard Tobacco Company aggressively marketed filtered cigarettes (Marlboro, Winston, and Kent, respectively), which were perceived as less dangerous than standard unfiltered cigarettes; The American Tobacco Company and Liggett & Myers Tobacco Company were not as

**Table 6.6. Domestic market shares of U.S. cigarette firms, selected years**

Year	R.J. Reynolds	Philip Morris	Brown & Williamson	American Brands	Lorillard	Liggett & Myers	Total
1913	0.2	NA*	NA	35.3	22.1	34.1	91.7
1925	41.6	0.5	NA	21.2	1.9	26.6	91.8
1940	21.7	9.6	7.8	29.5	5.4	20.6	94.6
1955	25.8	8.5	10.5	32.9	6.1	15.6	99.4
1970	31.8	16.8	16.9	19.3	8.7	6.5	100.0
1975	32.5	23.8	17.0	14.2	7.9	4.4	99.8
1980	32.8	30.8	13.7	10.7	9.8	2.2	100.0
1985	31.7	35.8	11.8	7.4	8.2	5.0	99.9
1991	27.8	43.4	11.1	7.0	7.3	3.4	100.0
1996	24.6	47.8	17.2	NA	8.4	1.9	99.9

\*NA = Not available.

Sources: Tennant 1950; Overton 1981; Clarifield 1983; Standard & Poor's 1989, 1993; Federal Trade Commission 1997.

successful in marketing their competing brands (Johnson 1984). Similarly, after the 1964 release of the U.S. Surgeon General's first report on the health consequences of cigarette smoking, and after the Federal Trade Commission's (FTC) publishing of tar and nicotine content in the late 1960s, Philip Morris Companies Inc. and R.J. Reynolds Tobacco Company introduced and aggressively marketed low-tar and low-nicotine cigarettes (again, products perceived as healthier than existing cigarettes), whereas the other companies were less successful. As a result of the brand loyalty these two firms were able to establish at this time, they came to dominate cigarette markets; in 1996, the two firms had a combined market share of 72.4 percent.

Another notable change in the tobacco industry, beginning in the 1960s, was the diversification of the cigarette-manufacturing companies. Perhaps in part to offset the impact that the campaign to reduce tobacco use had on the industry's profitability, the six major domestic cigarette producers acquired or merged with U.S. firms in a variety of nontobacco markets, including food, alcoholic beverages, and transportation. Both U.S. and international cigarette producers significantly expanded their international activities. Diversification was relatively easy because of the high profitability from cigarettes and the low long-term debt of these firms (Overton 1981). By 1972, no major domestic cigarette company was completely dependent on tobacco for its revenue (Johnson 1984). During the 1980s, diversification strategies and successes among the six firms varied markedly; some firms returned to a focus on cigarettes and other tobacco products, whereas others diversified further. By the late 1980s, a three-tiered classification of world cigarette producers, based on their international activities, had emerged: those involved in most global tobacco markets (Philip Morris Companies Inc., B.A.T. Industries PLC, R.J. Reynolds Tobacco Company, and Rothmans International Tobacco Ltd.); those with some international, but not global, activities (including American Brands, Inc.); and smaller firms concentrating primarily on their domestic markets (including Liggett & Myers Tobacco Company and Lorillard Tobacco Company) (USDHHS 1992).

### **Economic Implications of Concentrated Tobacco Production**

The concentration of production among relatively few firms in the cigarette industry has implications for cigarette pricing, marketing, product development, and other activities. Clearly, the cigarette industry is an oligopoly; no more than six firms have controlled virtually all cigarette output in the United States for the

past 80 years (Table 6.6). Economic theory suggests that firms in oligopolistic industries have substantial market power in that their production decisions will have a significant impact on price. Moreover, these firms recognize their interdependence. That is, each firm recognizes that its pricing and marketing strategies have a significant impact on the sales and profitability of its competitors, as well as on its own sales and profitability. Consequently, each firm understands that its competitors are likely to respond to any changes in its own pricing, marketing, or other strategies.

Economic theory provides several possibilities regarding the conduct and performance of firms in an oligopolistic industry. At one extreme, if entry is easy and if sunk (nonrecoverable) costs are low, firms in an oligopolistic industry will behave competitively. That is, firms will have little market power (their output decisions will have little impact on market prices), prices will reflect the costs of production, and firms will not earn excessive profits. At the other extreme, firms could behave collusively, jointly restricting output, raising prices well above costs, and earning very high profits. Most theoretical models of oligopolistic industries suggest behavior between the two extremes: prices and profitability will be above and output will be below what would result from highly competitive behavior, and output will be higher and prices and profitability will be lower than their levels in a monopolized or highly collusive industry.

Casual empiricism suggests that cigarette prices have historically been well above costs, thereby allowing cigarette producers to achieve a rate of return well above that earned in most other industries. Even after the health consequences of cigarette smoking became apparent, the U.S. tobacco industry led all U.S. industries in profitability (Miles 1982). Moreover, in the two major antitrust cases brought against the cigarette industry in the 20th century, firms were found guilty in 1911 of monopolization and in 1946 of a conspiracy to restrain trade (collusion). Most industry analysts suggest that the primary source of market power in the cigarette industry is the entry barriers resulting from marketing efforts, which create significant brand loyalties that are nearly impossible for a new producer to overcome.

### **High Tobacco Concentration and the Impact of Prevention Policies**

The high concentration of the cigarette industry and the apparent market power this concentration engenders have implications for the effects of changes in cigarette taxes and other prevention policies on the

pricing, marketing, and other strategies of cigarette firms. For example, the historically high profitability of existing cigarette producers provides them with the resources needed to successfully develop and market new products, as was seen in the development and introduction of filtered cigarettes in the 1950s and low-tar and low-nicotine cigarettes in the 1960s in response to the initial reports linking cigarette smoking to lung cancer. More recently, in response to the increased awareness of the harmful effects of environmental tobacco smoke (ETS) on nonsmokers and the widespread restrictions on smoking that have been designed to protect nonsmokers, R.J. Reynolds Tobacco Company introduced its Eclipse brand in several test markets beginning in mid-1996, and Philip Morris Companies Inc. is currently testing its Accord brand in the United States and Japan. Both are ostensibly "smokeless" cigarettes, primarily heating rather than burning tobacco; consequently, both generate less secondhand smoke than conventional cigarettes.

Economic theory can predict some effects of increases in excise taxes on price, output, and profitability. At one extreme, tax increases in a perfectly competitive market with constant costs of production should result in price increases of the same magnitude with no impact on long-run profitability. Reductions in output would depend on the effect that price has on demand. At another extreme, standard models for a monopolized market suggest that producers and consumers would share the burden of the tax increase but consumers would pay a greater share of the tax, because demand is less sensitive than production to price. Output and profitability would fall, with smaller reductions in both—again because demand is less sensitive to price. Recent advances in the theoretical and empirical study both of oligopolistic behavior and of the supply of addictive goods have yielded several interesting predictions. Perhaps most interesting is the possibility that prices will increase by more than the amount of the tax increase when excise taxes are raised.

Several early studies of these relationships produced generally inconsistent conclusions concerning how much cigarette prices would increase after an increase in cigarette taxes (Barzel 1976; Johnson 1978; Sumner 1981; Sumner and Ward 1981; Bulow and Pfleiderer 1983; Bishop and Yoo 1985; Sullivan 1985; Sumner and Wohlgenant 1985; Ashenfelter and Sullivan 1987). One general weakness of these studies was their failure to account for the dynamic interaction of firms in an oligopolistic industry. Instead, the studies generally assumed that rules for the firms' behavior were established, and then, with observed prices and taxes, the studies worked backward to

determine the degree of competition within the industry (Harris 1987).

More recent studies have addressed these weaknesses. Harris (1987) used the estimates obtained from several studies of cigarette demand and supply to evaluate the impact of doubling the federal cigarette excise tax in 1983; moreover, Harris' framework allowed the change in the tax to affect the interaction of firms in the industry. Using data on wholesale and retail cigarette prices as well as the costs of production, Harris concluded that the 8-cent increase in the tax led to a 17-cent increase in the retail price of cigarettes. He further argued that the price increase above the tax hike could not be accounted for by increases in production costs. Instead, this increase was attributed to the recognized interdependence of cigarette firms in an oligopolistic industry; that is, the firms recognize that their profitability would rise if all could successfully restrict output and raise prices. However, because formal agreements on output and prices are illegal, the firms are alert to other bases on which they can coordinate their behavior. Harris suggested that such a base was the announced increase in the federal tax, scheduled for January 1, 1983, which served as a coordinating mechanism for a joint oligopolistic price increase. As Barnett and colleagues (1995) note, Harris' analysis fails to account for existing trends in cigarette prices. Barnett and colleagues argue that Harris attributed too much of the coordinated rise in price to the increase in the federal tax, because the upward trend in prices predates the consideration of the tax hike. The authors suggest that producers used the introduction of discount cigarettes in 1981 to coordinate the earlier price hikes for premium brands, because the lower-priced "generic brands" would keep more price-sensitive smokers in the market. The spirit of this argument is the same as Harris', because both suggested that certain events served as focal points allowing firms to engage in more collusive behavior without appearing to establish a formal agreement.

Keeler and colleagues (Sung et al. 1994; Barnett et al. 1995; Keeler et al. 1996) used national- and state-level data to estimate the effects of cigarette tax increases on price. Their empirical models have been used to examine the interaction of cigarette supply and demand in determining cigarette prices. By using alternative assumptions about firm behavior, these studies formally account for the oligopolistic aspects of the cigarette industry in their empirical models of cigarette supply. At least some of these models also account for the addictive nature of cigarette demand.

In a study using data on all U.S. states from 1960 through 1990, Keeler and colleagues (1996) conclude

that the oligopolistic behavior of the industry results in increases in cigarette prices that exceed increases in state excise taxes. A 1-cent increase in the state tax would raise retail prices in that state by an average of 1.11 cents. Moreover, the researchers conclude that producers selectively lower prices in states with stronger state and local antismoking laws, offsetting the impact of tobacco control policies. Similarly, a study using data on 11 western states for the same period predicts that the state cigarette price would rise by 1.27 cents for every 1-cent increase in the state cigarette tax (Sung et al. 1994).

Another study by Barnett and colleagues (1995) suggests that increases in federal cigarette excise taxes would generate larger increases in cigarette prices than those that would result from state tax hikes. These investigators attribute this phenomenon to the increase in sales across state borders, which can result from a state tax increase and can thereby limit the impact of the tax increase on price. A 1-cent increase in the federal cigarette tax was predicted to raise cigarette prices by just over 1.0 cent, whereas a comparable increase in state cigarette taxes would yield an estimated retail price increase of about 0.9 cents. The investigators conclude that the industry has been less competitive since 1980; they attribute this finding both to the relatively lax enforcement of antitrust laws associated with the deregulatory climate of the 1980s and to the focal points that triggered more collusive behavior.

Basing their analysis on a published economic model of addictive behavior (Becker and Murphy 1988), Becker and colleagues (1994) suggest an alternative explanation for the observation that cigarette prices increase more than cigarette taxes increase: tobacco companies raise prices to obtain maximum profit from current smokers, for whom cost concerns alone will likely motivate reducing but not quitting their addictive behavior; these increased profits are intended to help offset future losses from the reduced demand that will occur among would-be new smokers, who will be put off by any price increase, whether from taxes or other causes. As is discussed later in this chapter (in "Effect of Price on Demand for Tobacco Products"), addiction is to some extent a wild card in estimates of price and demand. Becker and colleagues (1994) express this only-apparent paradox as follows: "If smokers are addicted and if the industry is oligopolistic, an expected rise in future taxes and hence in future prices induces a rise in current prices even though current demand falls when future prices are expected to increase" (p. 413). The same effect would apply to other anticipated changes in policies that would be expected to reduce future cigarette smoking. The authors

explain this hypothesis as follows: cigarette firms with market power may set relatively low prices to "hook" consumers on their addictive product, thus raising the future demand for their cigarettes; policies (including tax increases) that reduce future smoking also reduce the firms' profitability of maintaining low prices. Nevertheless, the relatively low prices of these forward-looking firms (compared with those of more myopic firms) will still exceed the marginal and average costs of production and distribution. A similar hypothesis has been used to explain studies that found that cigarette producers appear to advertise beyond the profit-maximizing level (Showalter 1991). These firms may be engaging in excessive advertising (i.e., more than can be recouped through brand switching among current smokers) to attract new consumers and hoping to later benefit from a higher demand for cigarettes as a result of these newly addicted consumers.

The rapid increases in cigarette prices since the early 1980s, which are only partly explained by increases in taxes and costs, thus reflect profit-maximizing behavior by a highly concentrated cigarette industry that anticipates decreased future demand as additional efforts to reduce tobacco use are implemented (Becker et al. 1994). An empirical application of this model to the supply and demand for cigarettes (Showalter 1991) supports these hypotheses concerning the behavior of firms with market power that are selling an addictive product.

A second group of empirical studies has focused on the relationships between industry concentration, restrictions on cigarette advertising, cigarette prices, and market power. One such analysis supports the conventional wisdom that advertising is an important competitive strategy in developing and maintaining brand loyalty for firms in the cigarette industry (Nguyen 1987). Another analysis, using an empirical model that allows firms in an oligopolistic industry to have some degree of market power, concludes that advertising raises market power and, consequently, profitability in the cigarette industry (Tremblay and Tremblay 1995). A likely explanation of this effect is that by fostering loyalty to existing brands, cigarette advertising raises barriers to other brands that try to enter the market and share in the profits.

Several studies (Porter 1986; Mitchell and Mulherin 1988; Eckard 1991) have concluded that banning cigarette advertising from television and radio made the industry even less competitive, thereby further raising profitability. One such study attributed the increases in cigarette prices after the advertising ban to the reduced competition resulting from the ban (Porter 1986). This conclusion was supported, to some



extent, by the observation by Doron (1979) that cigarette firms apparently favored the 1971 ban on television and radio advertising, although the firms' concerns about counteradvertising may have played a role as well (see "Advertising and Promotion" in Chapter 5).

## Discussion

The highly concentrated, oligopolistic structure of the U.S. cigarette industry has important implications for the effects of increases in cigarette excise taxes and of stronger prevention policies on cigarette prices. Much of the recent research on the supply of cigarettes has found that the cigarette industry became less competitive in response to the 1971 ban on cigarette advertising on television and radio. One consequence of this reduced competition was that cigarette prices rose more rapidly than they would have otherwise. Moreover, this research suggested that further reductions have occurred in competition since the early 1980s, partly because of the relaxed regulatory climate for business. Increases in cigarette excise taxes and stronger prevention policies have also contributed to the reduced competition. The net result of the increased market power of cigarette producers is that cigarette prices have risen more rapidly than production costs have increased. In addition, increases in cigarette taxes during this period resulted in greater than a 1:1 increase in cigarette prices.

Two recent activities, however, suggest that price competition in the cigarette industry is increasing at both the wholesale and the retail levels. In 1993, cigarette manufacturers experimented with price reductions on premium brand cigarettes through coupon and promotional activities beginning in April. This experiment was soon followed by a 25-percent drop in wholesale cigarette prices, which resulted in a sharp decline in retail prices (USDA 1994b). Although prices were eventually raised, these activities indicate that there may be greater price competition among cigarette producers in the future. Similarly, the recent growth of low-price stores specializing in the sale of cigarettes, such as the Cigarettes Cheaper! chain in the San Francisco area and Puff 'N' Stuff in northern Illinois, has also reduced the retail price of cigarettes. These stores, which depend on high volume to profit, charge significantly less for cigarettes than supermarkets and other outlets do. For example, in mid-1994, a carton of premium cigarettes that cost \$18–22 in many outlets in California sold for \$14.99 at Cigarettes Cheaper!, and some name brands sold for even less (Schevitz 1994).

In contrast, the proposed June 20, 1997, national tobacco settlement would have reduced competition in the cigarette industry by granting cigarette companies an antitrust exemption to achieve the aims of the agreement. In its analysis of the proposed settlement, the FTC (1997) concluded that, based on past behavior and the structure of the industry, firms were likely to coordinate substantial price increases that would likely exceed the cost of the payments required by the agreement. Given this, the FTC concluded that the proposed settlement might generate substantial profits for cigarette producers.

## Trade Policy, Tobacco, and Tobacco Products

Although acreage devoted to tobacco production has fallen worldwide, technological improvements have led to overall increases in tobacco production (Roemer 1993). In 1999, estimated global production of tobacco was more than 6 million metric tons; more than 60 percent of this was accounted for by four countries: China (34.9 percent), India (9.7 percent), the United States (9.4 percent), and Brazil (8.2 percent). In some producing countries (e.g., Zimbabwe), nearly all tobacco production is exported.

Up to 85 percent of global tobacco production is used for cigarettes. In 1996, global cigarette production was nearly 6 trillion cigarettes; more than half of this production was accounted for by three areas: China (30.0 percent), the European Community (13.7 percent), and the United States (13.1 percent) (USDA 1997c). Although cigarette consumption is falling in industrialized countries, global consumption is rising because of significant increases in developing countries. This global increase in demand has created opportunities for U.S. and other global cigarette firms to expand. World trade in cigarettes has grown steadily for at least the past 30 years. U.S. cigarette firms capitalized on this growth, expanding cigarette exports from an average of 24.3 billion per year in the late 1960s to a peak of almost 250 billion in 1996; as a result, domestic cigarette production rose even as domestic sales declined rapidly.

Through the 1990s, nearly 30 percent of all cigarettes produced in the United States were exported. The major U.S. cigarette exporters are Philip Morris Companies Inc., R.J. Reynolds Tobacco Company, and Brown & Williamson Tobacco Corporation; these companies account for more than 99 percent of U.S. cigarette exports (FTC 1997). In 1981, the three firms formed the U.S. Cigarette Export Association to compete more

effectively in foreign markets (this type of association is exempt from antitrust law under the Webb-Pomerene Act).

As Grise (1990) notes, trade in tobacco and tobacco products would be even higher if not for general trade policies and, in particular, widespread agricultural and industrial policies that protect domestic tobacco growers and producers of tobacco products. Numerous countries have policies that support domestic tobacco growing; in the United States, examples are the tobacco support program and the short-lived mandatory minimum content of domestic tobacco in domestic cigarettes. Likewise, both tariff and nontariff barriers to trade in tobacco and tobacco products have been erected around the world. These barriers include quotas, restricted product lists, exchange controls, prior deposits, mixing regulations, licensing requirements, and limits on advertising and other promotional activities (Grise 1990). Moreover, in several countries (including Japan, South Korea, and Thailand), various aspects of the manufacture and distribution of cigarettes have long been controlled by government monopolies that have largely prevented the import of foreign cigarettes (GAO 1992).

When tariff and nontariff barriers to trade are used to protect domestic tobacco and tobacco products, total supply of these products is usually lower than it would be otherwise, whereas domestic supply is higher. In the case of tobacco products, this arrangement has public health benefits resulting from the generally higher prices and reduced consumption of the protected products. Domestic suppliers benefit by supplying more at higher prices. Foreign suppliers, however, are likely to lose in this arrangement, because their access to these markets is limited and costs of supplying the markets are higher. In addition, restrictions on advertising and promotion in given countries are likely to make it difficult for new firms to successfully enter newly opened markets where existing brands are firmly entrenched (Chaloupka and Corbett 1998).

### **Past Tobacco-Related Trade Policy**

In general, tobacco products exported from the United States are specifically exempted from federal laws and regulations concerning the export of potentially harmful products, including the Federal Hazardous Substances Act (Public Law 86-613), the Toxic Substances Control Act (Public Law 94-469), and the Controlled Substances Act (Public Law 91-513) (GAO 1992). Similarly, although federal regulations (1) require that all cigarette packaging and advertising in the United States contain health warning labels and

(2) prohibit television and radio cigarette advertising, there are no federal regulations or laws concerning the packaging or advertising of domestically produced cigarettes that will be exported (GAO 1992).

Various U.S. policies and programs have been used to help domestic tobacco growers and cigarette companies expand into foreign markets (Connolly and Chen 1993). These policies include the USDA's Food for Peace Program, which sent more than \$1 billion in domestically produced tobacco to developing countries in the 1970s and early 1980s, and the 1984 Export Credit Guarantee Program, which exported domestically grown tobacco and helped U.S. cigarette producers enter Mideast markets (including Algeria, Egypt, Iraq, and Turkey) (Taylor 1984). Perhaps the most important, however, is Section 301 of the Trade Act of 1974 (Public Law 93-618) and its subsequent amendments.

### **Section 301 of the Trade Act of 1974**

The Trade Act of 1974 was initiated by the Nixon administration when it sought permission to begin the Tokyo Round of GATT. GATT, an international trade agreement honored by nearly 120 countries, governs various aspects of international trade. (GATT is discussed in greater detail in "Multinational Trade Agreements," later in this chapter.) The first of these agreements was reached among 23 nations shortly after the conclusion of World War II. Since then, seven rounds have occurred, including the Uruguay Round, which concluded in April 1994 after more than seven years of negotiations.

The Trade Act of 1974 included in its final legislation various measures with the stated purpose of promoting free trade. One of these measures was Section 301, which gave the President the authority to investigate cases where trade and other practices of foreign countries were considered unjustifiable, unreasonable, or discriminatory in that they limited the ability of U.S. firms to sell their goods and services in foreign markets.

Section 301 expanded the authority given to the President by the Trade Expansion Act of 1962 (Public Law 87-794). That earlier legislation allowed for investigations of unjustifiable trade sanctions (those that directly violated GATT). Consequently, the act applied only to goods covered by GATT (which at the time excluded agricultural products, including tobacco). Section 301 expanded presidential authority to include trade in all U.S. goods and services and allowed the investigation of practices that were unreasonable but did not necessarily violate GATT. If negotiations were not successful in reducing or eliminating the unjustifiable

or unreasonable limits on trade, Section 301 authorized the President to impose retaliatory trade sanctions. Initially, Section 301 received little attention, although it would later become a widely used tool of U.S. trade policy (Nivola 1993).

Section 301 of the Trade Act of 1974 was strengthened by the Trade and Tariff Act of 1984 (Public Law 98-573) and the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418). Now known as "Super 301," the section required the U.S. Trade Representative to annually identify countries and their practices that consistently limited market access to U.S. firms. More important, if negotiations failed to eliminate the unfair trading practices of these countries, mandatory retaliatory measures were to be imposed unless the President deemed these measures harmful to U.S. economic interests.

Four Section 301 cases in the late 1980s dealt with cigarettes: cases against Japan in 1985 and Taiwan in 1986 were initiated by the U.S. Trade Representative at the President's request, and cases against South Korea in 1988 and Thailand in 1989 were the result of the U.S. Cigarette Export Association's petitioning of the U.S. Trade Representative. Threats of retaliatory sanctions under Section 301 led to agreements with each country; as a result, U.S. cigarette firms were permitted access to those markets. The opening of the markets resulted in aggressive tobacco advertising by U.S. firms (Roemer 1993). Each of the four newly "opened" countries has laws, regulations, and ordinances concerning cigarette advertising and promotion. The governments of some of the countries have alleged that U.S. cigarette companies have violated restrictions on advertising and promotion.

A brief review of the four Section 301 cases follows; more details are contained in reports from the GAO (1990, 1992), and an empirical analysis of their impact on cigarette smoking is contained in Chaloupka and Laixuthai (1996).

### *Japan*

The tobacco industry in Japan is largely monopolized by the company Japan Tobacco Inc. In 1979, Japan was the subject of two Section 301 cases, one involving cigars, which was prompted by the Cigar Association of America, and a second related to pipe tobacco, which was initiated at the request of the Associated Tobacco Manufacturers. The two cases were resolved in an agreement with Japan, which reduced market restrictions and lowered import duties (GAO 1990).

Before 1986, the domestic cigarette monopoly was protected from foreign competition through tariffs of 28 percent on all imported cigarettes and through Japanese distribution practices, which discriminated against imported cigarettes. The threat of Section 301 sanctions led to an October 1986 agreement that eliminated Japanese cigarette tariffs and changed excise tax payment procedures and other distribution practices that adversely affected imports of U.S. cigarettes. Existing Japanese policies related to cigarette advertising and other promotional practices were not affected by the agreement.

The agreement resulted in a significant expansion of U.S. cigarette firms in Japan. Japanese imports of U.S. cigarettes more than tripled in 1987 alone and continued to rise in 1988 and 1989, by which time the market share of U.S. firms was more than 15 percent (Grise 1990). This growth appeared to have slowed or stopped in the early 1990s. Total U.S. cigarette exports to Japan ranged from 54.0 billion to 57.7 billion annually during 1991-1993.

A downward trend during the 1970s and 1980s in per capita cigarette consumption in Japan appears to have reversed itself after the Japanese cigarette markets were opened to U.S. firms. Overall per capita consumption appears to have remained steady or increased slightly in recent years. However, among Japanese women, smoking prevalence rose from 8.6 percent in 1986 (before the agreement) to 18.2 percent by 1991. The 1991 rates were even higher among young adult women (27 percent) (Connolly and Chen 1993).

Part of this increase may be the result of advertising and promotional activities by U.S. cigarette firms in Japan. Between 1987 and 1990, total expenditures on cigarette advertising and promotion by U.S. cigarette companies in Japan nearly doubled. Most of these expenditures were on television advertising, which is allowed in Japan (but subject to some restrictions). Before the agreement, the domestic monopoly did not engage in extensive advertising. Afterward, it significantly expanded its advertising and promotional efforts. As a result, cigarette advertising moved from 40th to 2nd place in total television advertising in Japan (Sesser 1993).

### *Taiwan*

Virtually all aspects of the tobacco industry in Taiwan are controlled by a state-run monopoly. In 1986, the U.S. Trade Representative threatened Taiwan with retaliatory trade sanctions over several governmental policies that limited the market access of U.S. cigarette companies. These policies included quotas and tariffs

on imported cigarettes, a ban on the retail sale of imported cigarettes, and a ban on print advertising of imported cigarettes. An agreement was reached in December 1986 that reduced tariffs and eliminated other barriers, thereby allowing U.S. cigarette companies greater access to the Taiwanese cigarette market. The agreement also contained several restrictions relating to cigarette packaging (which was required to have a specified health warning label) as well as advertising and promotional activities (e.g., the distribution of free samples was limited and point-of-purchase promotions were restricted to licensed establishments).

The agreement greatly increased U.S. cigarette companies' access to the Taiwanese cigarette market. In 1987 alone, total U.S. cigarette shipments to Taiwan increased 24-fold, and the market share of U.S. cigarette companies rose from 2 to 17 percent (Grise 1990); by 1997, the market share of imported cigarettes had risen to 30 percent (Hsieh and Yin 1998). Moreover, Taiwan's imports of relatively higher-quality U.S. tobacco rose, as the portion of U.S. tobacco in Taiwanese cigarettes increased from 35 to 55 percent to better compete with imported cigarettes (Grise 1990). However, per capita consumption of cigarettes, after increasing somewhat during the 1970s and early 1980s, fell from 1987 through 1996, due to public and private antismoking policies (Hsieh and Yin 1998). Smoking prevalence among Taiwanese women significantly increased in the late 1980s and has remained stable throughout the 1990s (Hsieh and Yin 1998).

Advertising and promotion of U.S. cigarettes after the agreement are likely to have contributed to the large rise in the market share of U.S. cigarette companies in Taiwan. Before the agreement, the only advertising and promotion permitted by the Taiwan Tobacco & Wine Monopoly Bureau were new product announcements and the use of billboards in the bureau's branch offices and distribution centers (GAO 1992). In 1987, spending on advertising and promotional activities by U.S. cigarette firms in Taiwan rose sharply but fell somewhat in the next three years. Nevertheless, total spending rose by 43.8 percent from 1987 to 1990 (GAO 1992). Given preagreement restrictions on advertising and promotion, almost all of these expenditures would have been for point-of-purchase and magazine advertising. Advertising by the Taiwanese cigarette monopoly, however, was limited even further after the agreement.

Authorities in Taiwan have alleged that point-of-purchase promotional activities by U.S. cigarette companies have violated the terms of the 1986 agreement (GAO 1992). The agreement limits these activities to licensed wholesale, distribution, and retail establishments,

which the Taiwan Tobacco & Wine Monopoly Bureau defines as those with a permit registering them as profit-seeking enterprises. Taiwanese authorities contend that U.S. cigarette firms have distorted this definition to include unlicensed retailers selling cigarettes, resulting in widespread advertising and unauthorized sales of U.S. cigarettes (GAO 1992).

After 1987, the government of Taiwan enacted several strong tobacco control policies, largely in response to the liberalization of cigarette trade resulting from the Section 301 agreement (Hsieh and Yin 1998). Many of these policies were initially rejected by the U.S. Trade Representative as unfair or discriminatory toward the tobacco industry and in violation of the 1986 agreement. One contentious issue pertained to the health warning labels proposed for cigarette advertising and packaging. The Taiwanese government initially proposed a set of strong, rotating health warning labels that would appear on the front of cigarette packaging and on all advertising. In response to the U.S. Trade Representative's opposition, the content of the label was changed to "excessive smoking is dangerous to health," and the label was placed on the side of packaging (Hsieh and Yin 1998). Eventually, in 1992, the labels were changed to include six rotating warnings communicating more specific information about the hazards of smoking.

The dispute over the Smoking-Hazards Prevention Act, introduced in 1991 with the stated aim of protecting the public health by preventing and controlling damage from tobacco products, was even more contentious (GAO 1992). The aim of the act would be accomplished by prohibiting smoking by those under 18 years of age, banning vending machine sales of tobacco products, limiting the tar and nicotine content of all cigarettes, requiring that the packaging of all tobacco products include not only health warning labels but also tar and nicotine content in Chinese, and banning all tobacco advertising and certain other promotional activities. The act was immediately challenged by the U.S. Trade Representative as a unilateral violation of the 1986 agreement that allowed U.S. cigarette companies to advertise in Taiwan (GAO 1992). Sesser (1993) reports that a confidential position paper drafted by the U.S. Trade Representative in January 1992 stated that the proposal was an attempt to protect the Taiwanese cigarette monopoly from foreign competition and that the various measures proposed would have little impact on smoking. In July 1993, the Clinton administration's U.S. Trade Representative, Michael Kantor, stated that his office would not challenge the act if it was enacted (Sesser 1993). Six years after its introduction, the Smoking-Hazards Prevention Act was

finally enacted with compromise clauses that permit cigarette advertising in magazines (Hsieh and Yin 1998).

### *South Korea*

South Korea's Tobacco & Ginseng Corporation controls all aspects of that country's tobacco growing and production, which had traditionally been protected by high tariffs imposed on foreign cigarettes. In 1982, South Korea enacted and aggressively enforced legislation making it a criminal offense to sell, buy, or possess foreign cigarettes (Eddy and Walden 1993). Beginning in 1987, almost all cigarette advertising and other promotional activities were banned by the Tobacco Monopoly Act. After petitioning by the U.S. Cigarette Export Association in January 1988, the U.S. Trade Representative investigated these practices. In response to the threat of retaliatory sanctions on South Korean textile exports to the United States, a Record of Understanding was signed by the two countries in May 1988. This agreement opened South Korean cigarette markets to U.S. firms by eliminating the ban on the sale of foreign cigarettes, reducing the tariff on imported cigarettes, allowing the distribution of free samples, and allowing some print advertising of cigarettes and the sponsorship of sporting events. The agreement also prohibited advertising that targeted women and young people (smoking is prohibited in South Korea for persons under 20 years of age). Finally, all cigarette packaging and magazine advertising were required to include a health warning label.

Although cigarette smoking had been increasing steadily in South Korea during the 1980s, the rate of growth in smoking more than tripled when cigarette markets were opened to foreign competition (Roemer 1993). Much of the increase appeared to have been the result of dramatic increases in smoking prevalence among young people. From 1988 to 1989 alone, smoking prevalence among male teenagers rose from 18 to 30 percent, and smoking prevalence among female teenagers increased from 2 to 9 percent (Sesser 1993). Much of the increase in consumption was accounted for by the increased use of imported cigarettes. Import share in the market rose from 0.06 percent before the agreement to nearly 8.5 percent in 1994 and continued to increase steadily (U.S. Department of Commerce, Tobacco Export Task Force Analysis, unpublished data, November 13, 1995). Part of the increase may be attributable to an increase in advertising by U.S. cigarette companies in South Korea after the liberalization of cigarette trade. In late 1988, South Korea passed the Tobacco Business Act (effective January 1, 1989), which limited advertising and promotional efforts to point-of-purchase

advertising, magazine advertising, and sponsorship of public events (GAO 1992). In 1991, the Korea Tobacco Association (comprising the U.S. Cigarette Export Association firms and the Korean tobacco monopoly) outlined a self-regulating voluntary marketing agreement to comply with the Record of Understanding and the Tobacco Business Act.

Nevertheless, the South Korean government indicates that some promotional activities of U.S. cigarette companies violate the spirit of the Tobacco Business Act. These allegations concern distribution of free cigarettes, advertising placement for televised events sponsored by U.S. tobacco firms, the distribution of nontobacco "gifts" bearing company trademarks, and the targeting of youth. Although no formal actions related to these violations were initiated, the Koreans did begin renegotiating the Record of Understanding with the United States in 1995. In August 1995, the United States government agreed to modify the market access agreement with the Koreans to allow them greater flexibility to impose nondiscriminatory, health-based measures that restrict the use of tobacco products, including limitations on tobacco product advertising.

### *Thailand*

Perhaps the most publicized and contentious Section 301 dispute was initiated by the U.S. Trade Representative in response to petitioning by the U.S. Cigarette Export Association in April 1989 over Thailand's virtual ban on the import of cigarettes and complete ban on cigarette advertising and other promotional activities in that country. The complaint cited various restrictions on the importation and sale of cigarettes and referred to discriminatory duties and taxes on cigarette imports (GAO 1992). All aspects of the domestic tobacco markets in Thailand are controlled by a government-run monopoly, which stopped its own cigarette advertising and promotion in April 1988. However, foreign companies continued their activities, which prompted a total government ban on cigarette advertising in Thailand in February 1989. The formal investigation began in May. After no agreement could be reached, the U.S. Trade Representative consented to submit the complaint to the GATT dispute resolution process.

The panel created by GATT investigated the U.S. complaint that the import barriers and advertising restrictions were a violation of the international agreement's principles. In October 1990, the GATT Council sustained the panel's recommendations and ruled that the ban on imports was a violation of the

GATT treaty. However, the council upheld the high Thai cigarette excise taxes (applied to both domestic and foreign cigarettes) and the right of the government to restrict the overall supply of cigarettes. Regarding the Thai advertising ban, the council noted that GATT allows member nations to use various policies to protect public health if the policies are applied to both domestic and foreign products. A cigarette advertising ban that made it difficult for new foreign firms to compete with existing domestic firms was ruled justifiable under the treaty, because allowing advertising could stimulate the demand for cigarettes, particularly among youth (Contracting Parties to the General Agreement on Tariffs and Trade 1991; Roemer 1993). This decision was based on Article XX of GATT, which states that:

Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting parties of measures . . . necessary to protect human . . . health [or] necessary to secure compliance with laws or regulations which are not inconsistent with the provisions of this Agreement.

The GATT ruling led to an agreement in November 1990 between the United States and Thailand that allowed the importation of U.S. cigarettes into Thailand. Imported cigarettes were then subject to the same laws and regulations as those marketed by the Thai Tobacco Monopoly (GAO 1992). Thus, U.S. cigarettes would be taxed the same and subjected to the same supply restrictions, and the advertising and promotion of these cigarettes (including the use of cigarette company logos, trademarks, and other symbols on nontobacco products) would be prohibited. The Thai government, however, has indicated that U.S. cigarette companies have tried to circumvent the ban on promotional activities by tactics such as sponsoring sporting events and placing cigarette logos or symbols in televised programming. No formal complaints have been filed.

After its success in upholding the ban on advertising and promotion, the Thai government in 1992 enacted two laws restricting smoking: the Non Smokers Health Protection Act and the Tobacco Products Control Act. The first act restricted smoking in designated public places. The second was a comprehensive act that required that all tobacco products disclose

their ingredients, allowed the Ministry of Public Health to determine all aspects of labeling, including health warnings, and banned the following: smoking by those under 18 years of age (imposing fines on violators); vending machine sales; distributing free samples, exchanges, and gifts of cigarettes; tobacco advertising (including, under the Thai definition of advertising, the use of cigarette logos and other symbols on nontobacco products) except in international magazines and live telecasts originating outside Thailand; advertising products with the same name as tobacco products; producing, importing, advertising, and selling products imitating tobacco products; and selling cigarettes not complying with the labeling provisions (Roemer 1993).

The cigarette trade agreement that opened the Thai cigarette market to U.S. firms has led to a rise in imports from less than 1 percent of the market before the agreement to about 4 percent in 1993. Because of current trends, this change is likely to increase substantially in the future (e.g., U.S. cigarette exports to Thailand rose by more than 56 percent from 1992 to 1993). Part of the increase may be the result of increased smoking prevalence among women and young people in Thailand (USDA 1994a).

## **Multinational Trade Agreements**

### ***The North American Free Trade Agreement***

In 1993, the United States approved the North American Free Trade Agreement (NAFTA), a comprehensive agreement that eliminated most of the barriers to trade between the United States, Canada, and Mexico; implementation began January 1, 1994. This agreement further reduced already low trade barriers between the United States and Canada resulting from an earlier free trade agreement. More important, the new agreement substantially reduced existing trade barriers between the United States and Mexico by eliminating all nontariff barriers to trade and by phasing out most tariffs. Mexican tariffs on U.S. tobacco and tobacco products were initially set at 50 percent the 1998 rate was 25 percent. Supporters of the agreement argued that it would lower prices, lead to a net increase in jobs (particularly in export industries), and spur economic growth in all three countries. Opponents countered that U.S. firms would have an incentive to shift production to Mexico to reduce labor and other operating costs, thereby leading to a net reduction in U.S. employment.

Before the agreement, some trends in tobacco production in the United States, Canada, and Mexico were similar. Total tobacco production and acreage devoted to tobacco growing in 1990 were well below their 1981 levels in all three countries, but downward trends in the United States had reversed by 1987. Similarly, in recent years, tobacco production in Mexico has been expanding (USDA 1997d). During the 1980s and early 1990s, cigarette consumption fell sharply in both the United States and Canada but rose in Mexico. At least part of the increase in the Mexican demand for cigarettes resulted from increases in income, which contributed to a shift to the consumption of higher-quality cigarettes among Mexican smokers (USDA 1992). Since 1994, however, cigarette imports into Mexico have fallen as consumer purchasing power declined; no imports were expected in 1997 (USDA 1997d).

Trade in tobacco among the three countries was relatively limited before the agreement. Mexican exports of tobacco to the United States were about 5 percent of total exports, or less than 2 percent of total U.S. tobacco imports. Similarly, less than 4 percent of U.S. tobacco imports came from Canada, and about 7 percent of U.S. tobacco exports went to Canada. Finally, almost no tobacco was exported from the United States to Mexico (USDA 1992).

Trade in tobacco products (mainly cigarettes) was even more limited before the agreement. In 1990, just over 0.1 percent of total U.S. cigarette exports went to Mexico, and only 0.07 percent went to Canada. Similarly, there was no trade in cigarettes between Canada and Mexico. The only exception was for exports of cigarettes from Canada to the United States, which were almost 64 percent of total Canadian cigarette exports and almost 20 percent of total Canadian production (USDA 1992). However, as is discussed later in this chapter (see "International Tobacco Taxes"), most of these cigarettes were reintroduced into a Canadian black market to evade the significantly higher Canadian cigarette taxes (Sweanor and Martial 1994).

Because of the earlier free trade agreement between the United States and Canada, NAFTA does not appear to have had a significant impact on trade in tobacco and tobacco products between the two countries. If anything, the reduction in Canadian cigarette taxes in 1994 has led to a substantial reduction in Canadian cigarette exports to the United States, as the smaller differential in cigarette prices reduced the incentive to export cigarettes to the United States for bootlegging back into Canada.

The agreement's elimination of Mexican import licenses on tobacco and cigarettes, and gradual reduction

in Mexican tariffs on tobacco and tobacco products, however, were expected to increase Mexican imports of both flue-cured and burley tobacco as well as cigarettes from the United States (USDA 1992). The elimination of U.S. tariffs on Mexican tobacco and the improved quality of this tobacco were also expected to result in increased Mexican tobacco exports to the United States. Privatization of the unmanufactured tobacco industry in Mexico, however, has changed the nature of the industry and has led to an improvement in the quality of Mexican leaf tobacco (USDA 1997d). The slow elimination of tariffs and the improved quality of domestically grown tobacco, coupled with the decline in the value of the peso, appear to have limited the impact of NAFTA on trade between the United States and Mexico in tobacco and tobacco products. This may change, however, as tariffs are further reduced and, eventually, eliminated and if the peso continues its recent strengthening against the dollar.

### *Uruguay Round of GATT*

This latest GATT agreement, which concluded in April 1994, involved 117 countries, and many other nonmembers have agreed to abide by its provisions. Formal approval of the agreement by the U.S. Congress came at the end of 1994.

Several basic principles are outlined in GATT: a commitment to achieving free trade by limiting and eventually eliminating tariff and nontariff barriers to trade, the nondiscriminatory application of any restrictions on trade to all member countries, the compensation of trading partners for any damages resulting from changes in trade barriers, and the negotiated settlement of any trade disputes through an orderly process rather than through retaliation. However, GATT has had no enforcement power.

Since the conclusion of its first round in 1947, GATT has led to sharp reductions in tariffs and other impediments to trade in manufactured goods. Before the most recent round, GATT had not been applied to trade in agricultural commodities or services. The 1994 Uruguay Round, however, significantly expanded GATT's coverage to include trade in agricultural products, services, and more. Moreover, the new agreement created the World Trade Organization, a permanent forum for GATT members to address trade-related issues among member countries. This forum strengthened GATT's ability to resolve trade disputes.

Supporters of the GATT treaty have argued that it will lead to a substantial increase in world trade to the economic benefit of all countries involved. For example, President Bill Clinton stated in the introduction to the

Uruguay Round Agreements Act that the treaty, when fully implemented, would add \$100–200 billion to the U.S. economy annually and would create hundreds of thousands of new jobs. He went on to note that because the United States is the world's largest trading nation, it would be the biggest beneficiary of the treaty (U.S. Congress 1994).

The Uruguay Round of GATT was expected to benefit the U.S. tobacco industry by reducing the historically high tariffs on tobacco and tobacco products imposed in numerous countries and by reducing other widely used nontariff barriers to trade. For example, the European Community would reduce tariffs on cigars by 50 percent, tariffs on cigarettes and other manufactured tobacco products by 36 percent, and tariffs on unmanufactured tobacco by 20 percent, and the Philippines would reduce tariffs on leaf tobacco, cigars, and cigarettes by 10 percent (USDA 1994b). Similarly, foreign access to U.S. markets would rise, as U.S. tariffs on cigar wrappers would be eliminated. At the same time, U.S. tariffs on cigar filler and binder tobacco, cigars, and most cigarettes would be reduced by 55 percent; tobacco stems and refuse by 20 percent; and other unmanufactured tobacco and smoking tobacco by 15 percent (USDA 1994b).

More important, Section 422 of the Uruguay Round Agreements Act allowed the President of the United States to waive Section 1106(a) of the Omnibus Budget Reconciliation Act of 1993 if he determined that this action was necessary or appropriate to comply with international trade agreements that include the United States. As noted previously, the 1993 legislation requiring that cigarettes manufactured in the United States include a minimum of 75 percent domestically grown tobacco or face penalties was waived by President Clinton's tariff rate-quota proclamation in September 1994.

The reductions in tobacco-related trade barriers achieved in the Uruguay Round appear to have had a dramatic impact on global trade in tobacco and tobacco products (Chaloupka and Corbett 1998). From 1994 to 1997, for example, there was a 12.5-percent increase in unmanufactured tobacco exports globally, following a decade of almost no growth; similarly, global cigarette exports rose by 42 percent from 1993 to 1996, while global cigarette consumption rose by 5 percent (Chaloupka and Corbett 1998). As discussed previously, however, the GATT Council's resolution of the tobacco-related dispute between Thailand and the United States clearly indicates that the adoption and implementation of strong tobacco control policies aimed at improving public health is consistent with the liberalization of trade.

## **Discussion and Recent Developments**

The threat of retaliatory trade sanctions under Section 301 of the Trade Act of 1974 has successfully opened some foreign markets to U.S. cigarette manufacturers, thereby significantly expanding trade in tobacco products between the United States and these countries. Chaloupka and Laixuthai (1996), in their empirical examination of these agreements, concluded that the market share of U.S. cigarette companies in the affected countries was 600 percent higher, on average, in 1991 than it would have been in the absence of these agreements. More important, they concluded that overall cigarette smoking rose as a result of the Section 301 agreements. Chaloupka and Laixuthai (1996) estimated that per capita cigarette consumption in 1991 was 10 percent higher, on average, in the four countries than it would have been had the markets remained closed to U.S. cigarettes. They attributed the increase in smoking to greater competition in the cigarette markets, resulting in lower cigarette prices and increased cigarette advertising. In addition, they predicted that similar actions in other historically closed countries would lead to similar increases in cigarette smoking.

Similarly, the implementation of multinational agreements liberalizing trade, including trade in tobacco and tobacco products, is likely to further increase U.S. exports of tobacco and tobacco products to countries around the world. A probable consequence of this increase is that the prices of cigarettes and other tobacco products will fall as trade barriers are reduced or eliminated and competition is enhanced. As is discussed in detail later in this chapter (see "Effect of Price on Demand for Tobacco Products"), reductions in price will stimulate the use of cigarettes, particularly among adolescents and young adults. Because of the substantial health consequences associated with cigarette smoking, one likely result of the increased liberalization of trade in tobacco and tobacco products, then, is a global increase in morbidity and mortality related to cigarette smoking and other tobacco use. Recent estimates confirm the relationship between trade liberalization and tobacco use. Taylor and colleagues (i press) conclude that reductions in trade barriers globally have led to increased tobacco use, with the largest impact in low- and middle-income countries.

The apparent conflict between some U.S. policies that promote free trade and help U.S. firms enter foreign tobacco markets and other U.S. policies that both discourage smoking domestically and support international efforts to reduce tobacco use has been described in two GAO reports. The reports were completed in



the request of congressional members concerned about U.S. efforts to open foreign cigarette markets. In the second report, the GAO (1992) presented the U.S. Trade Representative's position "that as long as cigarettes remain a legal commodity in the United States and abroad, there is no legal basis to deny cigarette manufacturers assistance in gaining market access. Thus, when [the U.S. Trade Representative] determines that unfair foreign trade barriers, such as import restrictions and discriminatory practices, hinder the import and marketing of U.S. cigarettes abroad, it negotiates for their removal" (p. 23). Similarly, the U.S. Trade Representative maintained that the USDHHS's "jurisdiction does not extend to trade policy—it does not have a foreign affairs mandate. Its clear responsibility lies in the domestic realm, not the international one" (p. 24).

In the first report on this predicament, the GAO (1990) had offered three alternatives for reconciling those apparent conflicts in U.S. policy:

- If Congress believes that trade concerns should dominate, it may choose to do nothing to alter efforts aiding U.S. cigarette exporters even while it continues to promote awareness (domestically and internationally) of the health consequences of smoking and to encourage efforts to reduce smoking.
- If Congress believes that health considerations should have primacy, it may grant the USDHHS the responsibility to decide whether to pursue trade initiatives involving products with substantial health consequences (including cigarettes and other tobacco products).
- Rather than having one policy dominate, Congress could require that health matters be included in the trade policy process through the participation of the USDHHS so that these issues could be considered case by case.

Several factors indicate that the apparent dichotomy between trade and health policy is changing in favor of the third approach suggested by the GAO. For example, in 1989 a bill was introduced in Congress to (1) require U.S. cigarette firms in foreign markets to operate under the same guidelines as they do in domestic markets, (2) mandate health warning labels on all exported tobacco products, and (3) strongly discourage the executive branch from assisting U.S. tobacco company efforts to open foreign tobacco markets (Roemer 1993). Later that year, as a result of the U.S. Trade Representative's investigation of Thailand's trade practices, a public hearing on the case was held.

Numerous congressmen, public health officials, and others (including former U.S. Surgeon General C. Everett Koop) testified against tobacco-related U.S. trade policies (Eddy and Walden 1993). Although neither effort was successful (the bill did not pass, and the hearing produced no change in trade policy), both linked the issue of the health consequences of tobacco use to U.S. trade policy. The 1990 GAO report, for example, was the direct result of the failed 1989 bill.

More recently, interagency discussions between the office of the U.S. Trade Representative and officials from the USDHHS have pursued the harmonization of trade and health policy while representatives from the USDHHS have participated in recent negotiations with Taiwan, South Korea, and others concerning cigarette trade issues (Holzman 1997). Moreover, the U.S. Trade Representative has shown greater sensitivity to public health concerns and has not opposed nondiscriminatory tobacco control legislation in other countries (Bloom 1998; National Cancer Policy Board 1998). This position has been formalized as part of the Doggett Amendment to the Department of Commerce and Related Agencies Appropriations Act, 1998, that allows for the use of Section 301 in very limited circumstances. Specifically, the Doggett Amendment, sponsored by Lloyd Doggett (D-TX), states that:

None of the funds provided by this Act shall be available to promote the sale or export of tobacco or tobacco products, or to seek the reduction or removal by any foreign country of restrictions on the marketing of tobacco or tobacco products, except for restrictions which are not applied equally to all tobacco or tobacco products of the same type (Public Law 105-119, Section 618).

Similar guidelines were distributed by the Clinton administration to all diplomatic posts in February 1998. These guidelines state that:

In light of the serious health consequences of tobacco use, the U.S. Government will not promote the sale or export of tobacco or tobacco products or seek the reduction or removal by any foreign country of nondiscriminatory restrictions on the marketing of tobacco or tobacco products. At the same time, the U.S. Government will continue to seek elimination of discriminatory trade practices and will strive to ensure that U.S. firms are accorded the same treatment in foreign countries as that country's own firms and firms from other countries (The National Economic Council and The National Security Council of the White House,

Final Guidelines on Health, Trade, and Commercial Issues, facsimile transmission to all diplomatic and consular posts, February 16, 1998).

Moreover, as part of the guidelines, U.S. diplomatic "posts are encouraged to assist and promote tobacco-control efforts in host countries."

Several important issues remain unresolved. Perhaps most important is the opening of Chinese cigarette markets to U.S. and other multinational tobacco companies as part of China's World Trade Organization accession. With more than 300 million cigarette smokers (67 percent of men but only 7 percent of women), China is a particularly attractive market for international cigarette producers. In recent years, U.S. and other multinational tobacco companies have entered the Chinese tobacco markets through joint ventures with the Chinese government's tobacco monopoly, the China National Tobacco Corporation (Holzman 1997).

## **Economic Impact of the U.S. Tobacco Industry**

Tobacco growing played a key role in the development and growth of the U.S. economy. Throughout much of the 20th century, however, the importance of tobacco to the overall economy has diminished significantly, although its regional and local importance in some areas remains high. Several recent studies provide more detailed evidence concerning the economic importance of tobacco to the U.S. economy.

A recent study by American Economics Group, Inc. ([AEG] 1996), which was funded by the tobacco industry, provides some information concerning the impact of tobacco on the U.S. economy in 1994. The report updates similar previous reports by other firms, including that by Price Waterhouse (1992). AEG divided the macroeconomic effects of tobacco into those affecting the core sector, which includes tobacco production and distribution, and those affecting the supplier sector, which consists of industries producing and distributing intermediate goods for the core sector (including the goods and services used in cigarette production). The analysis also separately considered expenditure-induced impacts, which depend on the multiplier effects associated with spending by those in the core and supplier sectors, and tobacco-related tax revenues, including those raised by tobacco taxes, general sales taxes on tobacco products, and income and other taxes on tobacco industry employees and firms. The study estimated that in 1994, more than 1.8

million persons were employed, earning \$54.3 billion in wages and benefits, as a result of the tobacco business in the United States. Total estimated tax revenue from tobacco were almost \$36 billion in 1994. The report concluded that tobacco made a significant contribution in every state and the District of Columbia.

Several recent studies, however, have indicated that these estimates significantly overstated the economic impact of tobacco on the U.S. economy. At the request of the Coalition on Smoking OR Health (CSH), Arthur Andersen Economic Consulting (1993) reviewed the Price Waterhouse estimates for 1990. The study concluded that, as a result of several methodological flaws, the Price Waterhouse "employment and job loss figures are grossly inflated" (p. 1). For example, of the 681,351 jobs Price Waterhouse attributed to tobacco in its core and supplier sectors, only 259,616 were directly related to tobacco growing, manufacturing, warehousing, and wholesaling. Of the difference, 166,791 were retail jobs and 254,944 were supplier jobs, most of which were not devoted full-time to tobacco. Thus, stating that these jobs depended on tobacco was inaccurate.

Other studies questioned the Price Waterhouse assumption that every one job that is dependent on tobacco creates, through the multiplier effect, an additional 2.35 jobs throughout the economy. This assumption would result because those who purchase tobacco products would generate income for those who produce and those who distribute tobacco, who in turn would spend this income on other goods and services—thereby generating income for others, as this effect spread even further. Warner (1994) and Arthur Andersen Economic Consulting (1993) noted that this multiplier effect likely to significantly overstate the impact of tobacco because it implicitly makes the incorrect assumption that money spent on tobacco would not be spent elsewhere in the absence of tobacco. Instead, those funds not spent on tobacco would be spent on other goods and services, creating jobs and generating income that would also be spent.

Warner and Fulton (1994) addressed these issues by using a macroeconomic model to consider the net impact of tobacco on the economy of one state, Michigan. The Price Waterhouse study had estimated that direct tobacco-related employment in Michigan was 7,724 in 1990 and that all tobacco-related employment in Michigan totaled 69,575. Warner and Fulton (1994) estimated that in 1992 in Michigan, 7,843 jobs directly depended on tobacco but that only an additional 11,284 jobs were either indirectly related to tobacco or induced by spending from those whose jobs were dependent on tobacco. (This estimate for indirect tobacco-related jobs did not consider [as the Price Waterhouse estimated

did] the impact of income derived from tobacco production and distribution in the rest of the nation and spent on products produced in Michigan.) These researchers further estimated that, in the absence of tobacco, total employment in Michigan would have risen by about 5,600 because of a redistribution of spending away from tobacco products to other goods and services, including those more integral to the Michigan economy. As a result of the changes in employment, total incomes in Michigan would have been \$226 million higher in 1992 in the absence of tobacco. This amount resulted not only from incomes associated with new jobs but also from higher incomes for those with existing jobs (in part because of a change in job mix from lower-income to higher-income jobs in the absence of tobacco).

Warner and colleagues (1996) extended this analysis to examine the impact of tobacco on the regional economies of the United States. The researchers examined the effects of reducing or eliminating domestic expenditures on tobacco on nine regional economies (the eight regions defined by the U.S. Department of Commerce, Bureau of Economic Analysis, subdividing the Southeast into two parts based on tobacco growing and producing). They estimated that the elimination of spending on tobacco products in 1993 would have led to 303,000 fewer jobs in the Southeast tobacco region, while increasing jobs in all other regions by about the same amount. By the year 2000, they estimated that, under this scenario, the loss in jobs in the tobacco region would fall to about 222,000 as the regional economy adjusts, while the net impact nationally would be an increase in jobs of 133,000. A more realistic scenario—one that doubles the recent rate of decline in tobacco use—is estimated to have smaller effects on employment. Warner and colleagues (1996) estimated a loss of 36,600 jobs in the tobacco region by the year 2000, an amount equal to 0.2 percent of total regional employment. They concluded that the industry's claims concerning job losses resulting from reduced tobacco use are significantly overstated and that the impact of tobacco on employment should not be a primary concern, given the magnitude of the toll it takes on health.

The AEG and Price Waterhouse reports were limited also because they presented static estimates of the economic impact of tobacco (Arthur Andersen Economic Consulting 1993). That is, the reports ignored underlying trends in the domestic demand for cigarettes, trends in the import and export of tobacco and tobacco products, and changes in agricultural and manufacturing technologies that themselves are reducing employment in tobacco growing and manufacturing. Warner and

Fulton (1994) considered these factors by predicting the net impact that eliminating tobacco-related revenues would have on the Michigan economy if existing downward trends in tobacco sales continued: by 2005, the loss of revenue from tobacco in Michigan would yield a net gain of 1,500 jobs in the state.

A similar issue was considered in two recent reports of the USDA (1993, 1997c). The reports noted that the large declines in tobacco production throughout the 1980s had a relatively minor impact on the macroeconomics of major tobacco-growing regions. Indeed, total personal income, adjusted for inflation, grew by 14–57 percent from 1979 through 1989 in the nine major regions analyzed; the average growth in all U.S. tobacco-growing counties was 28 percent (USDA 1993). This phenomenon was attributed to the relatively small share of tobacco in these diverse regional economies (on average, less than 1 percent of total income was accounted for by tobacco in tobacco-growing counties). Even though acreage devoted to tobacco growing has declined over time, rising prices have helped to keep gross income from tobacco growing relatively stable, while clearly reducing the share of tobacco in local economies (USDA 1997c).

Critics of higher cigarette excise taxes and other policies to reduce tobacco use have argued that the macroeconomic consequences of these policies would be significant, particularly for some state and local economies. For example, economist Dwight R. Lee predicted that the 75-cent increase in the federal cigarette excise tax included in the proposed 1993 Health Security Act would lead to a loss of about 82,000 jobs and \$1.9 billion in incomes in the tobacco sector, which would cause an additional loss of 192,000 jobs and an attendant loss of income throughout the economy (U.S. House of Representatives 1994). He further noted that southern states would be particularly hard hit by this tax increase.

Similar arguments, based on the AEG and Price Waterhouse analyses, were made in the recent debate over proposed national tobacco legislation. For reasons noted previously, predictions based on these estimates are almost certain to substantially overstate the effects of higher tobacco taxes and stronger prevention policies on the U.S. macroeconomy. As discussed previously, Warner and colleagues' (1996) regional analysis of the economic role of tobacco concluded that tobacco has a negative net economic impact in all but the most tobacco-dependent region. Thus, it appears inappropriate to raise concerns about adverse economic impact in opposing policy measures that would discourage tobacco use.

Moreover, many supporters of legislation calling for increases in the cigarette excise tax have urged that measures be included to mitigate the possible adverse economic impact of the higher taxes for tobacco-producing regions. For example, Richard J. Durbin (D-IL) suggested that part of the revenues from higher cigarette excise taxes could be earmarked for efforts to help tobacco farmers switch to other crops, thereby easing the transition for tobacco-producing regions. Likewise, the CSH (1994) recommended that a portion of new tobacco tax revenues be earmarked for buying out tobacco allotments, constructing infrastructure and modernizing equipment for agricultural diversification, and stimulating economic development in areas relatively dependent on tobacco. Similarly, President Clinton called for assistance for tobacco farmers and their communities to be included in any tobacco legislation sent to him (USDA 1998a).

A final objection to the AEG and Price Waterhouse estimates is that they failed to consider the health and other consequences of cigarette smoking (Arthur Andersen Economic Consulting 1993). In one sense, they underestimated the economic contribution of cigarette smoking. As Schelling (1986) and Warner (1994) note with some irony, the employment figures in these and other industry-funded studies do not

include the income that tobacco generates for health care personnel, undertakers, and a variety of other persons whose jobs are related to the negative health consequences of tobacco use; nor do these industry estimates include the considerable income derived from specifically smoking-related services, such as air filtration systems. The total amount spent in the United States to treat smoking-related illnesses has been estimated to exceed the total amount spent on tobacco products (Centers for Disease Control and Prevention [CDC] 1994; Warner 1994). Similarly, as described in greater detail later in this chapter (in "Estimates of the Costs of Smoking"), the Price Waterhouse study did not include other economic costs associated with cigarette smoking, such as lost productivity due to smoking-related morbidity and mortality. Finally, as Northrup (1993) states, the Price Waterhouse estimates of employment dependent on tobacco invite a disturbing comparison, for they imply that "one person must die each year to sustain two jobs. Put another way, at least twenty-two people must die to support the forty-four year career of a [tobacco industry] employee. Surely, no one would argue that this is an acceptable trade-off. It is absurd for the tobacco industry to use lost jobs as a rationale for not saving lives" (p. 86).

## **Effect of Price on Demand for Tobacco Products**

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One of the fundamental laws of economics is that of the downward-sloping demand curve: as the price of a product rises, the quantity demanded of that product falls. In the terminology of economists, this inverse relationship arises from the process known as the consumer's constrained utility maximization. That is, when facing a given set of prices, consumers will try to maximize the benefits or satisfaction they receive from consuming, but these efforts are constrained by the consumers' available resources, including income and time.

The demand for tobacco products is different from the demands for most other consumer goods because of the addictive drug (nicotine) found in these products. The key implication that addiction has for demand is that past consumption decisions will be an important determinant of current choices. For example, to an addicted smoker, one of the benefits of continued cigarette smoking is avoiding nicotine

withdrawal. In the past, many researchers viewed addictive consumption as an irrational behavior not conducive to standard economic analysis (e.g., Elster 1979; Winston 1980; Schelling 1984). This view implied that the demand for addictive products, including tobacco, did not follow the basic laws of economics, including that of the downward-sloping demand function that ordinarily applies when constraints (such as cost) are raised against use. However, as will be described later in this section, numerous studies of cigarette smoking and other tobacco use, including several recent studies that explicitly account for tobacco's addictive nature, find a strong inverse relationship between price and consumption.

To economists, price includes not only the money price of purchasing a product but also the time and other costs associated with buying and using that product. Measures that limit minors' access to tobacco, for

example, may discourage underaged smoking by raising the time and potential legal costs associated with obtaining these products. Similarly, sufficiently stringent restrictions on smoking in public places will raise the costs of smoking, whether by forcing people outdoors if they want to smoke (thereby increasing time and perhaps comfort costs) or by imposing fines for smoking in restricted areas (thereby increasing money costs).

The health consequences associated with cigarette smoking are another important component of the price of cigarettes. As consumers perceive greater health risks from cigarette smoking, their demand for cigarettes tends to fall. This effect is clearly seen in the reductions in smoking prevalence and average cigarette consumption that occurred soon after the release of the 1964 Surgeon General's report on smoking and health, which for the first time drew widespread public attention to the health problems caused by cigarette smoking (U.S. Department of Health, Education, and Welfare 1964). Thus, when economists and others study the demand for tobacco products, efforts are made to include not only money prices but also measures that reflect the other costs of consuming these products.

In addition to price, several other factors affect the demand for any product. Disposable income, for example, is an important determinant of demand. In general, as income rises, so does consumption of most goods. Economists define these goods as normal goods. Inferior goods, on the other hand, are those for which demand falls as income rises. An individual's tastes or preferences will also affect demand. Because these tastes are difficult to observe and measure, certain sociodemographic characteristics are usually included as proxies in studies of the demand for tobacco. These characteristics include sex, ethnicity, education, religious beliefs, marital status, and employment status.

Finally, because the addictive nature of tobacco use has been clearly documented, many recent studies of demand have tried to account for the effects of past consumption on current consumption. Many of these studies were based on a model that applies the standard rational, utility-maximizing paradigm of economics to the consumption of addictive substances (Becker and Murphy 1988). This model explicitly recognizes the intertemporal links in consumption by making current consumption decisions dependent on past choices. The model thus incorporates the elements of tolerance, reinforcement, and withdrawal, which distinguish the consumption of addictive from non-addictive substances (USDHHS 1988).

Although many of the factors described in this introduction have an important impact on demand, the studies subsequently reviewed in this section emphasize the effects of money prices on cigarette smoking and other tobacco use. In reviewing empirical studies of the demand for cigarettes and other tobacco products, this section focuses primarily on estimates of the price elasticity of demand, which is defined as the percentage change in consumption that results from a 1-percent increase in price. (An overall reduction in cigarette consumption comprises both a reduction in the number of cigarettes consumed by current, persisting smokers and a reduction in the prevalence of smoking itself—which itself comprises both an increase in smoking cessation and a decrease in smoking initiation.)

Numerous studies have estimated the price elasticity of demand for cigarettes. These studies used diverse econometric and other statistical methods on different types of data from many countries. Relatively few studies have examined the demand for other tobacco products, and none have examined the effects on brand choice of the price differentials between premium brands and the lower-price discount and generic cigarettes.

## Studies Using Aggregate Data

Several studies of the demand for cigarettes in the United States have used aggregate data (Table 6.7). Some of these were time series studies for the nation as a whole or for geographic units (notably California). Others employed pooled cross-sectional time series data consisting of annual observations for some or all states over time. Price elasticity (the percentage change in the quantity demanded resulting from a 1-percent increase in price) estimates obtained from recent studies using aggregate data fall in the overall wide range of  $-0.14$  to  $-1.12$ , but most of these estimates are between  $-0.3$  and  $-0.5$ . Differences in the estimates resulted from differences in theoretical and empirical modeling, in the data employed, and in the econometric and statistical methods used to analyze these data.

All but two of these studies were econometric studies that tried to control for other factors that could affect the demand for cigarettes, including income, socioeconomic and demographic factors, and existing policies for reducing tobacco use. The other two studies (Baltagi and Goel 1987; Peterson et al. 1992) used alternative quasi-experimental methods that compared changes in cigarette consumption in states with tax increases with those in states with no tax increases; both studies obtained estimates of the price

**Table 6.7. Recent estimates of the price elasticity of cigarette demand from aggregate data**

Study	Estimated price elasticity	Comments
Advisory Commission on Intergovernmental Relations 1985	-0.45	Time series of state cross-sections, 1981–1983; ordinary least squares methods; detailed effort to account for short-distance smuggling of cigarettes.
Bishop and Yoo 1985	-0.45	Time series for United States, 1954–1980; three-stage least squares methods; simultaneous model of supply and demand.
Baltagi and Levin 1986	-0.14	Time series of 46 state cross-sections, 1963–1980; instrumental variables methods; partial adjustment model used to account for habitual consumption.
Porter 1986	-0.27	Time series for United States, 1947–1982; two-stage least squares methods; simultaneous model of supply and demand.
Baltagi and Goel 1987	-0.56 (1956–1964) -0.17 (1972–1983)	Time series of state cross-sections, 1956–1983; quasi-experimental methods.
Seldon and Doroodian 1989	-0.40	Time series for United States, 1952–1984; three-stage least squares methods; simultaneous model of demand and advertising.
Seldon and Boyd 1991	-0.22 (short run) -0.37 (long run)	Times series for United States, 1953–1984; varying parameter methods.
Showalter 1991	-0.56 to -0.71	Time series of annual state cross-sections, 1956–1988; simultaneous modeling of supply and demand with addiction; detailed modeling of short- and long-distance smuggling.
Simonich 1991	-0.37	Quarterly time series for United States, 1960–1983; two-stage least squares methods.
Tegene 1991	-0.66 (1956) -0.15 (1985)	Time series for United States, 1956–1985; Kalman filter methods; allows change in elasticity over time.
Chaloupka and Saffer 1992	-0.28	Time series of state cross-sections, 1975–1985; two-step endogenous law model; detailed modeling of short- and long-distance smuggling.
Flewelling et al. 1992	-0.25 to -0.35	Quarterly time series for California, 1980–1990; ordinary least squares and ridge regression methods.
Peterson et al. 1992	-0.49	Time series of state cross-sections, 1955–1988; epidemiologic approach.

Table 6.7. Continued

Study	Estimated price elasticity	Comments
Keeler et al. 1993	-0.3 to -0.5 (short run) -0.5 to -0.6 (long run)	Monthly time series for California, January 1980–December 1990; detailed modeling of addiction; full information maximum likelihood with instrumental variables and correction for autocorrelation.
Becker et al. 1994	-0.36 to -0.44 (short run) -0.73 to -0.79 (long run)	Time series of annual state cross-sections, 1956–1985; instrumental variables methods; detailed modeling of short- and long-distance smuggling and addiction.
Harris 1994	-0.47 (1993)	Annual time series for United States, 1964–1993; separate modeling of smoking participation and average consumption; controls for changes in average nicotine delivery per cigarette.
Hu et al. 1994	-0.39 (long run)	Monthly time series for California, January 1984–December 1991; intervention analysis.
Sung et al. 1994	-0.40 (short run) -0.48 (long run)	Time series of annual state cross-sections for 11 western states, 1967–1990; recursive model of supply and demand with addiction; generalized least squares methods correcting for heteroscedasticity and autocorrelation.
Barnett et al. 1995	-0.76 to -1.12	Annual time series for United States, 1955–1989; simultaneous modeling of supply and demand.
Goel and Morey 1995	-0.28 to -0.37	Time series of annual state cross-sections, 1959–1982; joint demands for cigarettes and alcohol; accounts for addiction.
Hu et al. 1995b	-0.30 (state tax elasticity)	Quarterly time series for California, 1980–1992; autoregressive moving-average time-series methods.
Moore 1995	Not applicable	Time series of annual state cross-sections, 1954–1988; reduced form estimates of impact of cigarette taxes on various smoking-related mortality rates.
Tremblay and Tremblay 1995	-0.41	Annual time series for United States, 1955–1990; simultaneous modeling of supply and demand.
Yurekli and Zhang 2000	-0.48 to -0.62	Time series of annual state cross-sections, 1970–1995; detailed modeling of smuggling and clean indoor air laws.

elasticity of demand comparable to those obtained in the econometric studies.

Several difficulties can be encountered when analysts use time series data to estimate the demand for cigarettes. In a time series model, estimated price and income elasticities of demand are sensitive to the inclusion of variables controlling for the effects of other determinants of smoking, including advertising, changes in existing policies for reducing tobacco use, and increased awareness of the health consequences of smoking. A serious problem can also result from the high correlations that are likely to exist among many of the variables reflecting key determinants of smoking. These correlations can lead to unstable estimates for the parameters of interest. However, excluding potentially important but highly correlated determinants of demand could produce biased estimates of the impact of the included variables on demand. Time series estimates are also more likely to estimate the short-run responses of demand to changes in independent variables rather than the long-run responses that are of greater interest to policymakers. However, recent studies using state-of-the-art econometric methods for time series data have appropriately addressed many of these difficulties (Seldon and Boyd 1991; Simonich 1991; Flewelling et al. 1992; Barnett et al. 1995; Hu et al. 1995b; Meier and Licari 1997). Almost all of the estimates obtained from time series methods based on alternative economic theories and applied to various data produced estimates of the price elasticity of demand in a relatively narrow range, which was centered on  $-0.4$ .

The use of state cross-sectional data over time can also create various estimation problems. In general, such studies considered in this section employed data on state taxes paid for cigarette sales; these data may not accurately reflect average cigarette smoking within the states, because cigarettes may have been smuggled from low-tax states into high-tax states. (This problem is discussed in detail in "Theoretically Optimal Cigarette Taxes," later in this chapter.) In particular, these sales data are likely to overstate consumption in low-tax states and understate consumption in high-tax states. If this smuggling is not controlled for, estimates of the price elasticity of demand from these data are likely to overstate the impact of price on cigarette smoking. However, many of the most recent studies of cigarette demand that employed pooled time series cross-sectional data for states made careful efforts to control for both casual and organized smuggling of cigarettes (Advisory Commission on Intergovernmental Relations [ACIR] 1985; Baltagi and Levin 1986; Showalter 1991; Chaloupka

and Saffer 1992; Becker et al. 1994; Yurekli and Zhang 2000). Although imperfect, these efforts should have significantly reduced the biases associated with the use of the pooled state data. When analyses controlled for the possible smuggling of cigarettes from low-tax to high-tax states, estimated price elasticities of demand that were based on state tax-paid sales data were generally in the range of  $-0.3$  to  $-0.5$ .

A further problem in the analysis of aggregate data arises because cigarette prices are determined by the interaction of supply and demand. Failing to account for simultaneity would lead to biased estimates of the price elasticity of demand. Several recent studies that employed both pure time series data and pooled state-level data have theoretically and empirically modeled the supply and demand for cigarettes (Bishop and Yoo 1985; Porter 1986; Showalter 1991; Sung et al. 1994; Barnett et al. 1995; Tremblay and Tremblay 1995). Most studies that controlled for the potential simultaneity biases in their aggregate data produced estimates of the price elasticity of demand that were in the narrow range found in other studies. An alternative approach to the simultaneity problem is to use natural experiments, such as the large increase in the California cigarette excise tax, to look at the impact of price on demand. Several recent studies have used this approach (Sung et al. 1994; Hu et al. 1995b). Estimates of the price elasticities of demand based on this natural experiment are consistent with those in other studies.

Many of the most recent studies of cigarette demand that used aggregate data empirically modeled the addictive aspects of cigarette consumption in the context of Becker and Murphy's (1988) economic model of addictive behavior (Showalter 1991; Becker et al. 1994; Sung et al. 1994). One of the most interesting implications of the economic models of demand for addictive goods, including cigarettes, concern short-run versus long-run effects. Economists generally define the short run as a period during which at least some factors have not fully responded to the change being examined. In contrast, the long run is when all changes have occurred; the Congressional Research Service (CRS) defined the long run for cigarette demand as 69 years, a time period that would allow the current 12- to 80-year-old population (which includes almost all smokers) to adjust to a change in cigarette taxes (Gravelle and Zimmerman 1994). For addictive goods, the long-run impact of price on demand will exceed the short-run impact because the latter largely entails current consumption, which represents an established addiction that tends to be slow to decrease even in the face of a price increase. In the



studies that used such a model, the estimated long-run impact of price elasticities of demand indeed exceeded—by up to twice as much—the estimates for the short-run impact, presumably because the long-run impact reflected would-be newly addicted consumers who were put off by price increases. (These short- and long-run effects are further discussed in “Tobacco Taxation and Revenues,” later in this chapter.)

Finally, studies employing aggregate data are generally limited because they estimate the effects of prices and other factors on aggregate or per capita estimates of cigarette consumption. Such studies thus cannot provide information on the effects of prices and other policies on smoking prevalence, initiation, cessation, or quantity and type of cigarette smoked. Similarly, these studies cannot explore differences that sex, age, and socioeconomic status may have on responsiveness to price and other policies. Furthermore, aggregate studies are of only limited use in considering the health effects of changes in existing policies for reducing tobacco use. A few recent studies have addressed some of these limitations. Harris (1994) used annual time series data on both smoking prevalence and average cigarette consumption among smokers during 1964–1993. The study estimated that the price elasticity of smoking prevalence in 1993 was  $-0.238$  and that the elasticity for average consumption among smokers was comparable; the 1993 total price elasticity of demand of  $-0.47$  was comparable to that obtained in other studies. Townsend and colleagues (1994) used aggregate data on smoking prevalence and average consumption constructed from the biennial data gathered in the British General Household Surveys from 1972 through 1990. The study found that men and women in lower socioeconomic groups were most responsive to changes in cigarette prices, that women were more responsive to price than men, and that smokers in the youngest age groups (16–19 years and 20–24 years) were least affected by price. In another study, Moore (1995) used state data from 1954 through 1988 to analyze the effects of cigarette taxes on smoking-related death rates. The study estimated that a 10-percent increase in cigarette taxes would prevent an estimated 5,200 smoking-related deaths each year.

### Studies Using Individual-Level Data

Relatively few studies of cigarette demand have been based on individual-level data. Table 6.8 summarizes the findings of these studies for samples of adults, and Table 6.9 presents the results of studies focusing on adolescents and young adults.

In general, the estimated price elasticities of demand obtained from these studies were comparable to those found in the aggregate studies. By using self-reported measures of smoking prevalence and average cigarette consumption, these studies avoided some of the problems associated with aggregate data on state taxes paid for cigarette sales. Each of these studies also carefully considered the effect that casual smuggling could have on their estimates of the price elasticity of demand. Moreover, because an individual smoker's purchase decisions are too small to affect the market price of cigarettes, the use of individual-level data in these studies avoided the potential simultaneity biases inherent in the use of aggregate data. However, the use of individual-level data may be subject to a substantial ecological bias, to the extent that omitted variables affecting tobacco use may be correlated with the included determinants of demand. Excluding these variables will, consequently, produce biased estimates for the included variables (see the later discussion of Wasserman et al. 1991). Furthermore, the use of individual-level data is subject to potential reporting biases. Studies using individual-level data have implicitly assumed that underreporting is proportional to true consumption (i.e., heavy, moderate, and light smokers underreport by the same proportion). With this assumption, elasticity estimates will not be systematically biased.

The use of individual-level data allows researchers to explore issues difficult to address adequately with aggregate data. In particular, researchers can use a two-part method to distinguish between the effects of cigarette price on two decisions: whether to smoke (smoking prevalence) and how many cigarettes to smoke (cigarette consumption). Likewise, the effects of cigarette prices on smoking cessation can be investigated. Individual-level data also allow researchers to explore the differential responses of various socioeconomic and demographic groups to changes in cigarette prices and existing prevention policies. However, the potential underreporting of cigarette consumption can be problematic in interpreting these data (Warner 1978).

Lewit and colleagues (Lewit et al. 1981; Lewit and Coate 1982; Grossman et al. 1983) were the first to use individual-level data to examine the effects of prices and smoking prevention policies. Lewit and Coate (1982) used data on 19,288 persons aged 20–74 years who had participated in the 1976 National Health Interview Survey. The investigators first estimated the effects of cigarette price on smoking prevalence and then looked at the effects of price on cigarette consumption. These equations were estimated not only for